

PATENT APPLICATION
042390.P11557X

AMENDMENT

Amendments to the Claims

1. (currently amended) A process of forming a memory device,
comprising:
forming a first topology over a substrate;
forming a first ferroelectric memory structure at the first topology and after
forming the first topology; and
forming at least one subsequent ferroelectric memory structure over the
first ferroelectric memory structure, wherein forming a first topology includes:
forming a first dielectric layer over the substrate;
forming a first metal layer over the first dielectric layer, wherein first metal
layer has a thickness ranging from about 0.1 micron to about 1 micron;
forming a second dielectric layer over the first metal layer;
forming a first electrode adjacent to the second dielectric layer;
forming a second metal layer over the second dielectric layer;
forming a third dielectric layer over the second metal layer;
forming a third metal layer over the third dielectric layer; and
forming a first filled via between the first metal layer and the second metal
layer.

Claims 2-4 (cancelled)

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5.(previously amended) The process according to claim 1, wherein forming a first ferroelectric memory structure further includes:
forming a first ferroelectric polymer memory layer over the first electrode;
and
forming a second electrode over the first ferroelectric polymer memory layer.

6.(previously amended) The process according to claim 1, wherein forming a first ferroelectric memory structure and forming a subsequent ferroelectric memory structure further includes:
forming a first ferroelectric polymer memory layer over the first electrode;
forming a second electrode over the first ferroelectric polymer memory layer;
forming a second ferroelectric polymer memory layer over the second electrode; and
forming a third electrode over the second ferroelectric polymer memory layer.

Claims 7-29 (cancelled)

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30.(currently amended) A method, comprising:

forming a first electrode over a substrate;

forming a first ferroelectric oxide memory layer over the first electrode,

wherein the first ferroelectric oxide memory layer has a thickness ranging from about 500 Å to about 2,500 Å;

forming a second electrode over the first ferroelectric oxide memory layer;

and

forming a second ferroelectric oxide memory layer over the first ferroelectric oxide memory layer, wherein the second ferroelectric oxide memory layer is larger than the first ferroelectric oxide memory layer.

31.(previously added) The method of claim 30, wherein the second ferroelectric oxide memory layer is formed so that a thickness of the first ferroelectric oxide memory layer is substantially equal to a thickness of the second ferroelectric oxide memory layer and so that a width of the second ferroelectric oxide memory layer is greater than a width of the first ferroelectric oxide memory layer.

32.(previously added) The method of claim 30, wherein forming the first ferroelectric oxide memory layer includes forming a ferroelectric oxide memory layer by chemical vapor deposition, spin-on deposition, or physical vapor deposition.

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33.(previously added) The method of claim 30, the first electrode has a width that is a minimum feature of a photolithography technology, selected from 0.25 micron, 0.18 micron, 0.13 micron, and 0.11 micron.

34.(previously added) The method of claim 30, further comprising:
forming a via coupled to the first electrode prior to forming the first ferroelectric oxide memory layer.

35.(currently amended) A method, comprising:
forming a structure having a cavity, wherein the structure is formed by:
forming a first electrode material over a substrate;
forming a first dielectric layer over the substrate and adjacent the first electrode material, wherein portions of the first electrode material and the first dielectric material define the cavity;
forming a via coupled to the first electrode; and
forming a first ferroelectric memory layer in the cavity over the first electrode material, wherein the first ferroelectric memory layer has a thickness ranging from about 500 Å to about 2,000 Å.

36.(previously added) The method of claim 35, wherein forming a first ferroelectric memory layer includes forming a first ferroelectric oxide memory layer in the cavity.

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37.(previously added) The method of claim 35, wherein forming a first ferroelectric memory layer includes forming a first ferroelectric polymer memory layer in the cavity.

38.(previously added) The method of claim 35, wherein forming a first ferroelectric memory layer includes forming a first ferroelectric memory layer in the cavity after forming the via.

39.(previously amended) The method of claim 35, wherein forming a via includes forming a via filled with tungsten coupled to the first electrode.

40.(previously added) The method of claim 35, further comprising:
forming a second electrode material over the first ferroelectric memory layer; and

forming a second ferroelectric memory layer in the cavity and over the first ferroelectric memory layer, wherein a volume of the second ferroelectric memory layer is greater than a volume of the first ferroelectric memory material.

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41.(previously added) The method of claim 40, further comprising:
forming a conductive layer over the second ferroelectric memory layer;
planarizing the conductive layer; and
patterning the conductive layer to form a third electrode; and
forming an interlayer dielectric (ILD) layer over the third electrode; and
forming a third ferroelectric memory layer over the interlayer dielectric
layer.

42.(currently amended). A method, comprising:
forming a structure having a cavity, wherein the structure includes at least
one dielectric layer, at least one metal layer, and at least one via; and
forming at least one ferroelectric layer in the cavity, wherein the at least
one ferroelectric layer has a thickness ranging from about 500 Å to about 2,000
Å.